



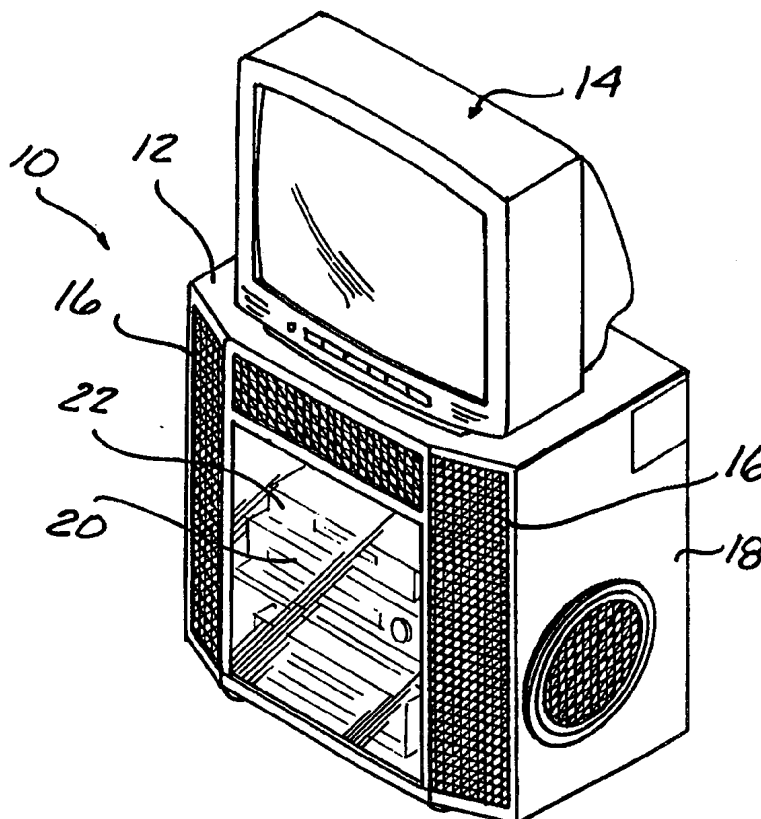
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US98/10412 <b>(22) International Filing Date:</b> 21 May 1998 (21.05.98)  <b>(30) Priority Data:</b> 08/861,102                      21 May 1997 (21.05.97)                      US  <b>(71)(72) Applicant and Inventor:</b> OPLINGER, Terry, R. [US/US]; 44199 Manitou Drive, Clinton Township, MI 48038 (US).  <b>(74) Agent:</b> BENEFIEL, John, R.; Suite 100B, 280 Daines Street, Birmingham, MI 48009-6244 (US).		<b>(81) Designated States:</b> CA, JP, MX, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

**(54) Title:** MULTI-CHANNEL SPEAKER SYSTEMS INTEGRATED INTO STORAGE-TELEVISION STAND CABINET CONFIGURATION

**(57) Abstract**

A home theater system configured as a television stand, audio-video equipment storage cabinet (10), and multiple speaker systems cabinet. Individual full range speakers or speaker systems are provided for each channel signal from recorded or broadcast sources and are prewired to terminals on the cabinet. The center channel speaker system is mounted on an upwardly tilted panel at the top of the cabinet, outwardly angled front corner panels mount the tweeter and possibly midrange speakers of right front and left front speaker systems, while woofer speaker components are mounted facing outward on side panels (18). Rear channel speakers are mounted to outwardly angled panels at the rear corners.



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**MULTI-CHANNEL SPEAKER SYSTEMS INTEGRATED INTO  
STORAGE-TELEVISION STAND CABINET CONFIGURATION**

**BACKGROUND OF THE INVENTION**

This invention concerns "home theater" speaker systems which most commonly receive and playback five separate "full range" (frequency bandwidth audible to the human ear) channels of audio.

The audio signals are received from such sources as videotapes, laser discs, television broadcasts, and most recently DVD discs. These signals may originate from the sound source in one of two basic configurations. One contains two channels which is encoded for matrixing to multi-channels. The other basic configuration contains six discrete (separate and independent) channels which include five full range and one low frequency channel. Either way, the signals are sent to an audio receiver or amplifier which then delivers five full range channels of audio signal to the speaker systems.

The typical arrangement for reproduction of the audio involves separate full range speakers or speaker systems as follows:

1. A center channel speaker located in a position which is horizontally aligned with the television.
2. Right and left front speakers positioned to each side of the television.
3. Surround speakers which are placed to the side or rear of the listener/viewer.

This arrangement requires substantial setup effort and the speakers are often difficult to integrate into the room decor and furnishings.

There have been efforts to provide a single cabinet with speakers capable of reproducing more than two channels of sound, as for example, described in U. S. Patent No. 5,533,129, issued on July 2, 1996 for a "Multidimensional Sound Reproduction System".

See also the advertisement for "Mission M-Time", page 15 of Stereo Review, February 1996.

1       Such efforts have not received separate full range line input  
2 signals for each channel and reproduced the same amount of separate  
3 acoustic channels of output unchanged. This would require a  
4 separate and dedicated full range speaker or speaker system for  
5 each channel within the cabinet. Instead these efforts can be  
6 characterized in two categories:

7       Category 1: Separate line input signals received for  
8 each channel are changed by altering or combining with  
9 other signals. Acoustic channels of output either differ  
10 in number or sound from the input. For example, the  
11 "Multidimensional Sound Reproduction System" cited above  
12 produces only three acoustic channels of output.

13       Category 2: Separate line input signals received with  
14 one channel fully reproduced as received and others  
15 partially reproduced requiring additional external  
16 speakers or speaker systems to reproduce the remaining  
17 sound. For example, the "Mission M-Time" cited above  
18 produces only one (center channel) full range channel of  
19 output with two channels reproduced in partial range.

20       It is the object of the present invention to provide a home  
21 theater cabinet which is capable of receiving three, four, or five  
22 separate full range line input signals and reproducing the  
23 equivalent amount full range acoustic channels of output, all  
24 emanating from the same cabinet.

#### 25       SUMMARY OF THE INVENTION

26       The above object is achieved by a cabinet configured as a  
27 television stand with audio/video (A/V) equipment storage, which  
28 has installed therein five complete full range speakers or speaker  
29 systems for reproducing each individual channel of a multiple  
30 channel audio program.

31       The speaker or speaker systems are prewired to a terminal  
32 panel at the rear of a cabinet. The rear of the A/V equipment  
33 storage area of the cabinet is preferably open to facilitate making  
34 cable connections to an A/V receiver supported on a shelf in the

1 cabinet.

2 The top of the cabinet functions as a television stand.

3 A center channel speaker system is mounted on a panel angled  
4 upward which is located at the top front of the cabinet.

5 Left and right speaker systems are included, which have  
6 midrange and tweeter speakers aligned on vertically angled front  
7 panels at each front corner of the cabinet, while woofer speakers  
8 for these systems are mounted to respective side panels facing  
9 outward from the center.

10 Surround or rear speakers may be also included which are  
11 mounted on respective rear corners of the cabinet, angled outwardly  
12 to direct the sound off the rear wall, to a side wall, the sound  
13 field therefrom heard as "surround" sound.

#### 14 DESCRIPTION OF THE DRAWINGS

15 Figure 1 is a perspective view of a television stand-speaker  
16 cabinet according to the present invention, shown with a television  
17 set supported thereon.

18 Figure 2 is a perspective view of the television stand-speaker  
19 shown in Figure 1, with the structures thereof shown in phantom to  
20 reveal the various speakers, A/V receiver, and speaker connection  
21 terminal panel.

22 Figure 3 is an enlarged rear perspective view of the  
23 television stand-speaker cabinet, showing the details of the  
24 connections between the A/V receiver and speaker connection  
25 terminal panel.

26 Figure 4 is a plan view diagram of the sound field  
27 distribution produced by the speaker sets, relative a  
28 viewer/listener.

29 Figure 5 is an exploded perspective view of the cabinet,  
30 speaker, grille, and glass door.

31 Figure 6 is a front view of the cabinet structure.

32 Figure 7 is a side view of the cabinet structure.

33 Figure 8 is a plan view of the cabinet structure.

34 Figure 9 is a plan view of an alternate embodiment which does

1 not have the rear speakers installed in the television stand  
2 cabinet.

### 3 DETAILED DESCRIPTION

4 In the following detailed description, certain specific  
5 terminology will be employed for the sake of clarity and a  
6 particular embodiment described in accordance with the requirements  
7 of 35 USC 112, but it is to be understood that the same is not  
8 intended to be limiting and should not be so construed inasmuch as  
9 the invention is capable of taking many forms and variations within  
10 the scope of the appended claims.

11 Referring to Figure 1, the television stand-speaker cabinet 10  
12 has a planar horizontal top 12 adapted to support a television 14.  
13 The cabinet 10 is a generally upright rectangular box structure,  
14 with shallowly angled front corners 16. Sides 18 are of a  
15 sufficient depth to accommodate an A/V receiver 20 and VCR 22 on a  
16 shelf in the middle of the cabinet 10.

17 Figure 2 shows the arrangement of the five speakers (or  
18 speaker systems). According to the concept of the present  
19 invention, multiple channels or tracks of recorded audio program  
20 are played back as by a VCR 22, reproduced by a respective one of  
21 the multiple speakers (or speaker sets) mounted in the cabinet 10.

22 For example, a five track audio signal is amplified by the A/V  
23 receiver 20, and transmitted via connections to a terminal board 24  
24 to a center speaker system 26 mounted to an upwardly tilted panel  
25 28 located above an opening 30 where the A/V equipment is situated.

26 Left and right speaker systems are also connected which  
27 include midrange and tweeter speakers 32, 34 mounted on angled  
28 panels 36, 38 at the front corners of the cabinet 10 and woofer  
29 speakers 40, 42 mounted on side panels 44, 46.

30 A pair of surround speakers 48, 50 are also connected to a  
31 respective output terminal, mounted to angled corner panels 52, 54  
32 at the rear corners of the cabinet 10.

33 Vent ports 56, 58 may also be provided in the angled front  
34 panels 36, 38 if the design of the woofer speakers 40, 42 require

1 a vented enclosure.

2 Figure 3 shows the speaker terminals on the A/V receiver 20,  
3 for each of the right rear (RR), main right (R), center (C), main  
4 left (L), and left rear (LR) channels.

5 Twin lead cables 56 and jacks are used to connect the  
6 corresponding terminals on the terminal board 24 at the rear of the  
7 cabinet 10. Cables 58 are prewired from the terminal board 24 to  
8 each corresponding speaker or speaker system as described above.

9 Figure 4 diagrams the sound field produced by the speaker  
10 system in relation to a viewer.

11 The right and left rear speakers LR and RR reflect off the  
12 rear and side walls to present the sound field to the viewer from  
13 the sides, creating a surround sound effect.

14 Figures 5-8 show construction details of the cabinet 10.

15 A top 60 is fixed onto the upper edges of parallel exterior  
16 side panels 44, inner side panels 62, top panel 28, front corner  
17 panels 36, 38, and rear corner panels 52.

18 The center channel baffle 28 is tilted backward somewhat so as  
19 to project the center speaker set soundfield upwardly to be  
20 connected to the action displayed on the television set on top 60.

21 The central cavity for the A/V equipment is defined by inner  
22 side panels 62, an inner top door 64, and bottom panel 66.

23 A hinged glass panel 68 covers the front of the cavity 30. A  
24 pair of shelves 70, 72 provide support for the A/V equipment.

25 The spaces between the side panels 44 and inner side panels 62  
26 accommodate the wiring and main speakers 32, 34, 40, 42, as well as  
27 rear speakers 48, 50. The space between the top 60 and inner top  
28 panel 64 accommodates the center channel speakers 26 and wiring.

29 The various panels can be constructed of veneer plywood,  
30 particle board, of similar material with a suitable finish.

31 The panels each have suitable cutouts to accommodate the  
32 respective speakers and ports, as shown.

33 A speaker grille 74 overlies the top panel 28 and center  
34 speakers 26, installed against the top panel 28 which is recessed  
35 from the front edge of the inner top 64.

1           Speaker grilles 76 cover the right and left speaker systems  
2   32, 34 and ports 56, 58, lying against front corner panels 36, 38.

3           Speaker grilles 78 are secured over woofers 40, 42. Right  
4   angled speaker grilles 80, 82 are installed to cover the rear  
5   corner spaces 84, 86.

6           Wheeled casters 88 support the cabinet 10 for easy movement.

7           Thus, a single cabinet provides a compact home theater system  
8   which is easily fit into any space, provides faithful reproduction  
9   of multi channel audio program recording, and is very convenient to  
10  hook up.

11          A three channel version of the television stand and A/V  
12  speaker cabinet 10A is shown in Figure 9 in which the rear speakers  
13  are not included, which can be separately wired.



**CLAIMS**

1. A home theater system comprising:

a combined cabinet configured as a television stand and audio-video speaker systems cabinet, having a planar top adapted to support a television;

a series of speakers or speaker systems mounted in said cabinet, each prewired to respective speaker terminals mounted on said cabinet;

an audio-video receiver having terminals outputting respective multiple track audio signals from playback of a recorded multiple track audio program;

cables connecting each of said cabinet speaker terminals with a respective receiver terminal, whereby said audio signals from said sound tracks are reproduced by a respective speaker or speaker system.

2. The system according to claim 1 wherein a center speaker system is mounted to a front panel on said cabinet, side speaker sets are mounted on either side of said cabinet, and rear speakers are mounted at the rear of said cabinet, each connected to reproduce a respective audio signal track.

3. A combined television stand and audio-video speaker systems cabinet comprising:

an upright, generally rectangular box-shaped cabinet having a planar top, front, two sides, and a rear portion, said top adapted to support a television;

a center channel speaker system mounted to an upper panel adjacent said top;

a right and left speaker system mounted at each side of said cabinet;

a right rear and left rear speaker mounted to said cabinet facing towards the rear; and,

a speaker terminal panel on said cabinet having a series of

terminals, each connected by wiring to a respective one of said center, right front, and left front speaker systems, and said right rear and left rear speakers.

4. The cabinet according to claim 3 wherein said right front and left front speaker systems include speakers mounted arrayed on respective outwardly angled front corner panels of said cabinet.

5. The cabinet according to claim 3 wherein said right rear and left rear speakers are mounted to outwardly angled rear corner panels of said cabinet.

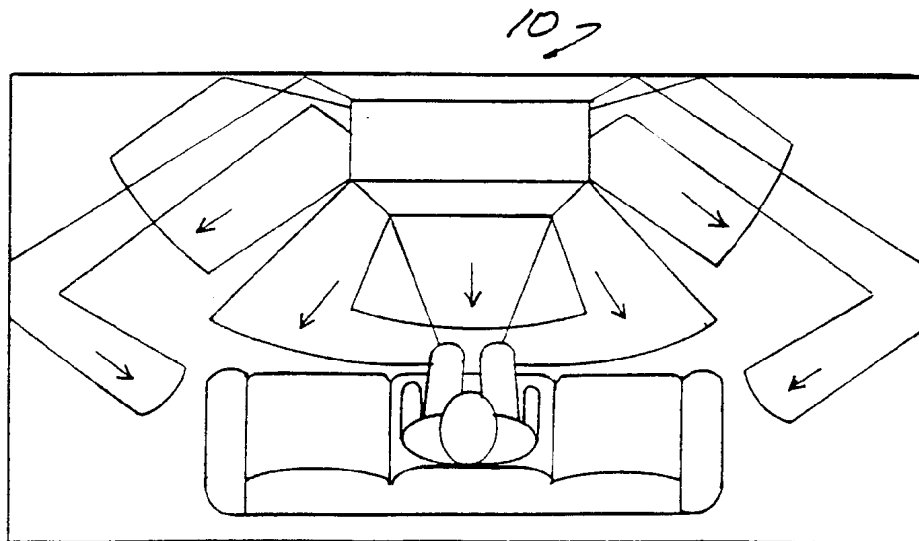
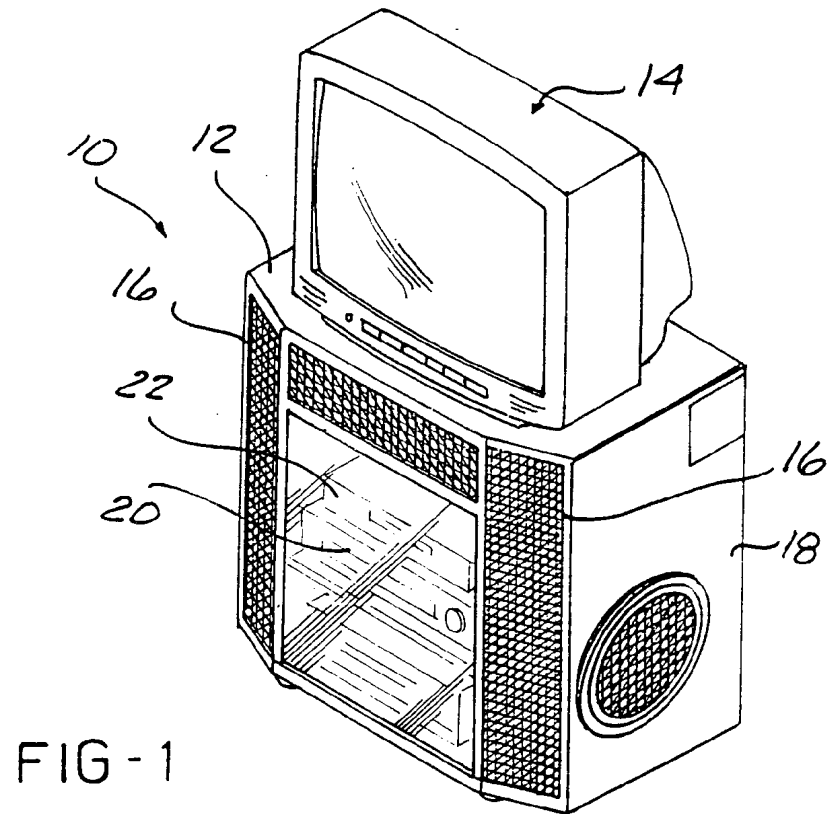
6. The cabinet according to claim 3 wherein said center speaker system is arrayed on an upwardly tilted front panel of said cabinet.

7. The cabinet according to claim 4 wherein said right front and left front speaker systems each include a woofer speaker mounted on a side panel of said cabinet.

8. The cabinet according to claim 3 wherein said cabinet includes a central cavity and shelving for audio/visual equipment.

9. The cabinet according to claim 5 further including a speaker grille for each rear speaker.

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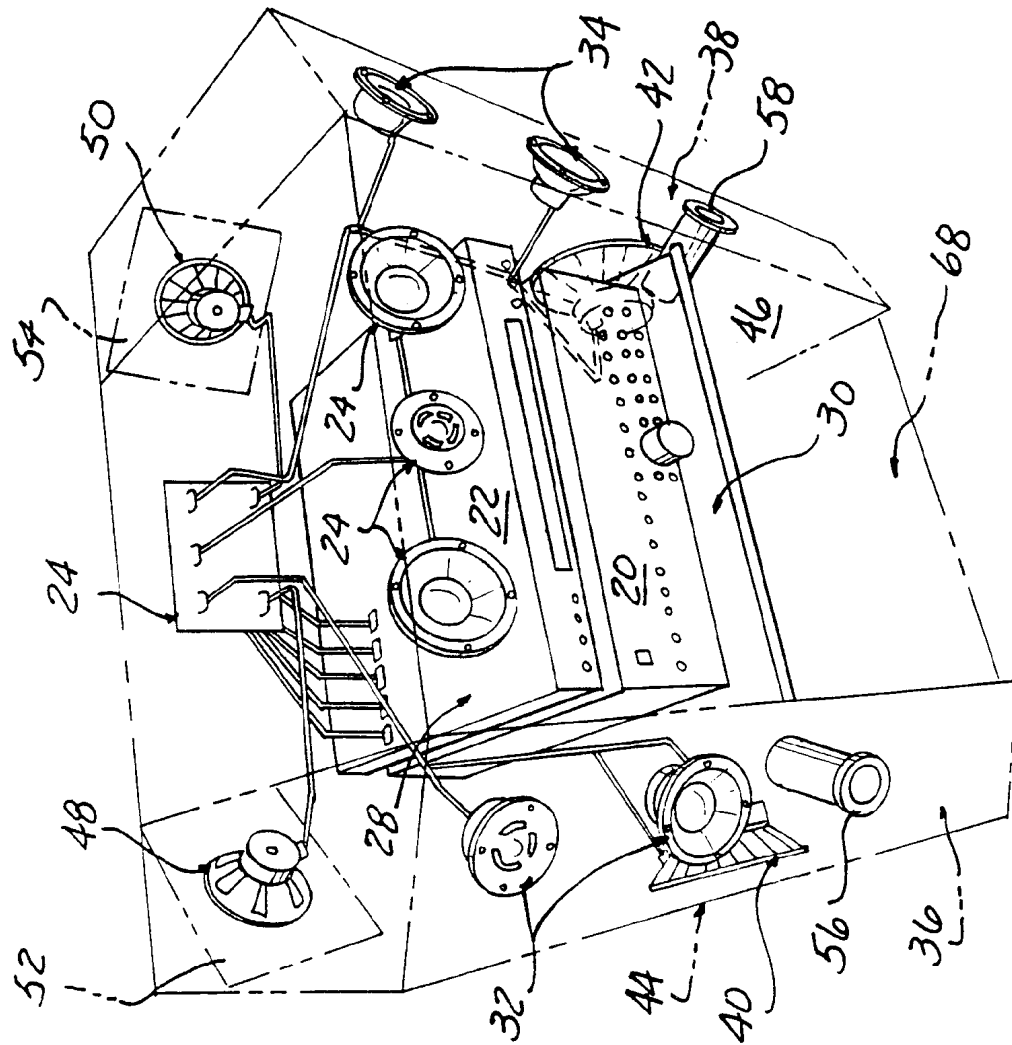


FIG - 2

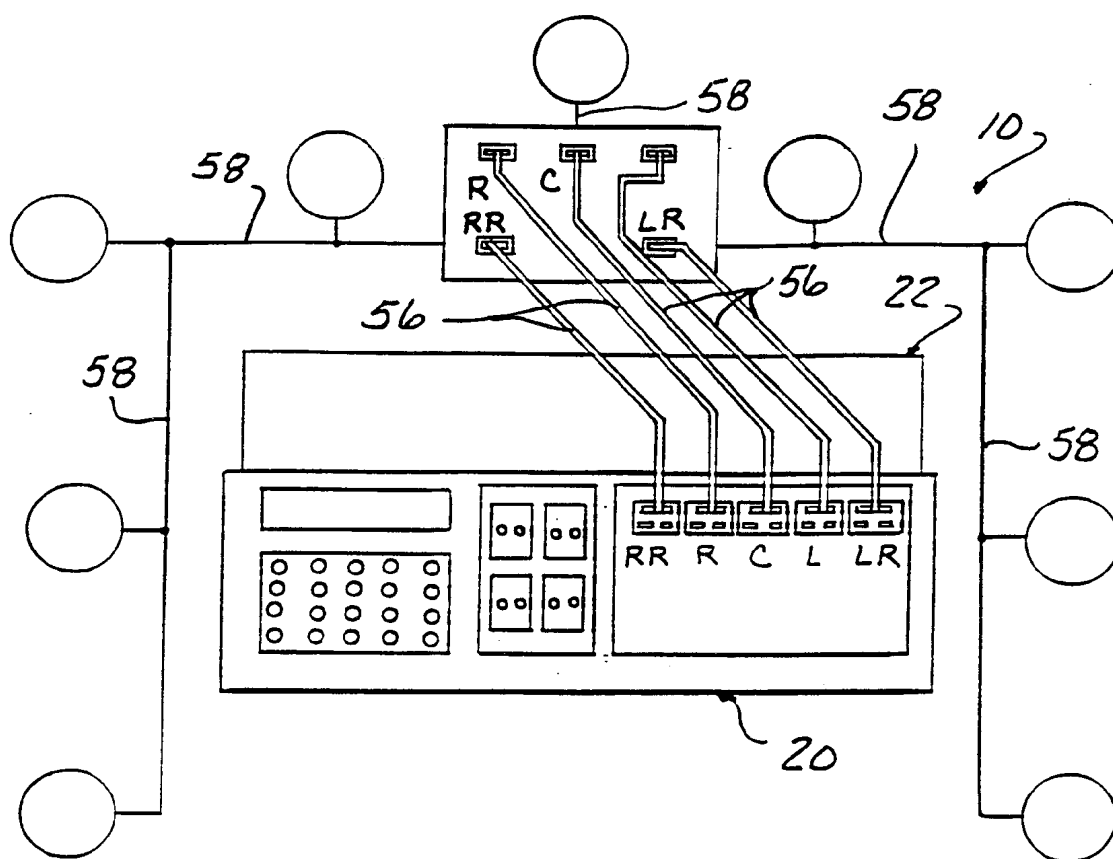


FIG - 3

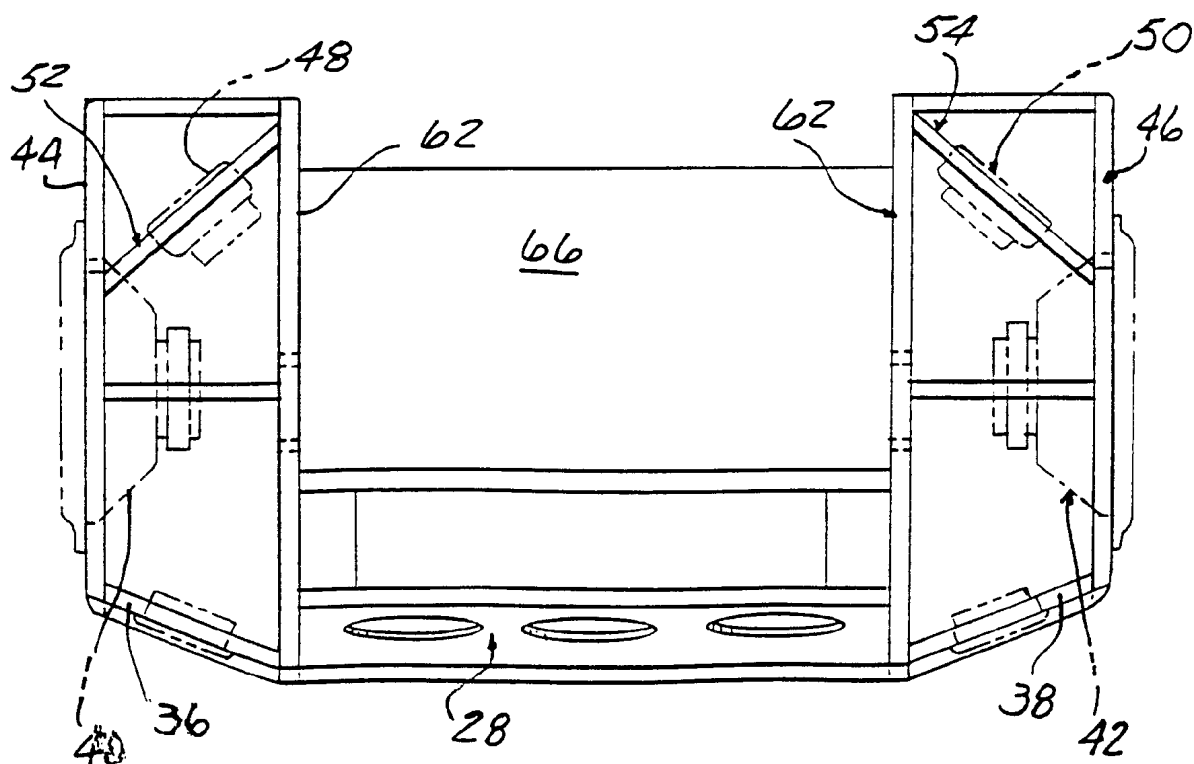
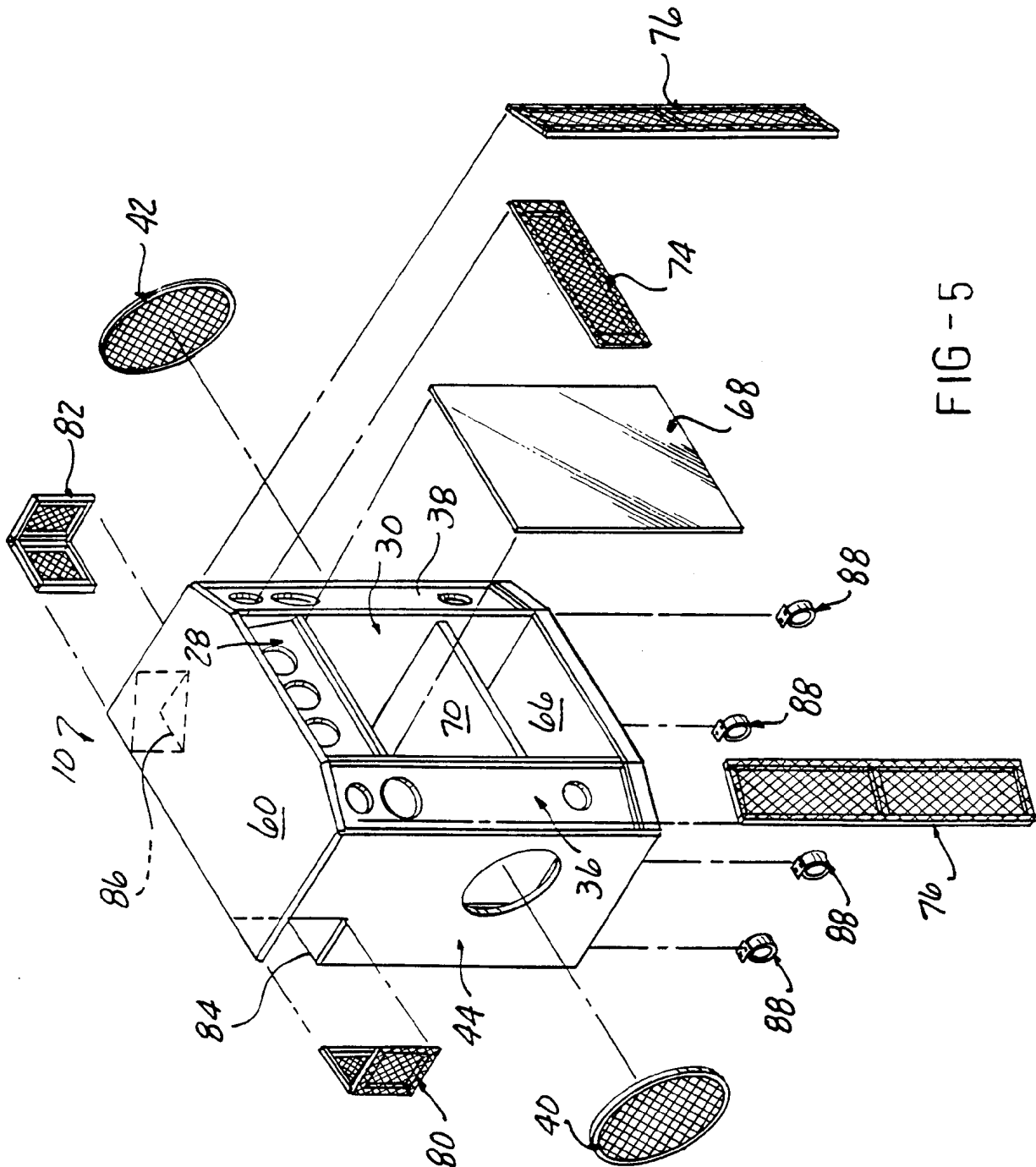


FIG - 8

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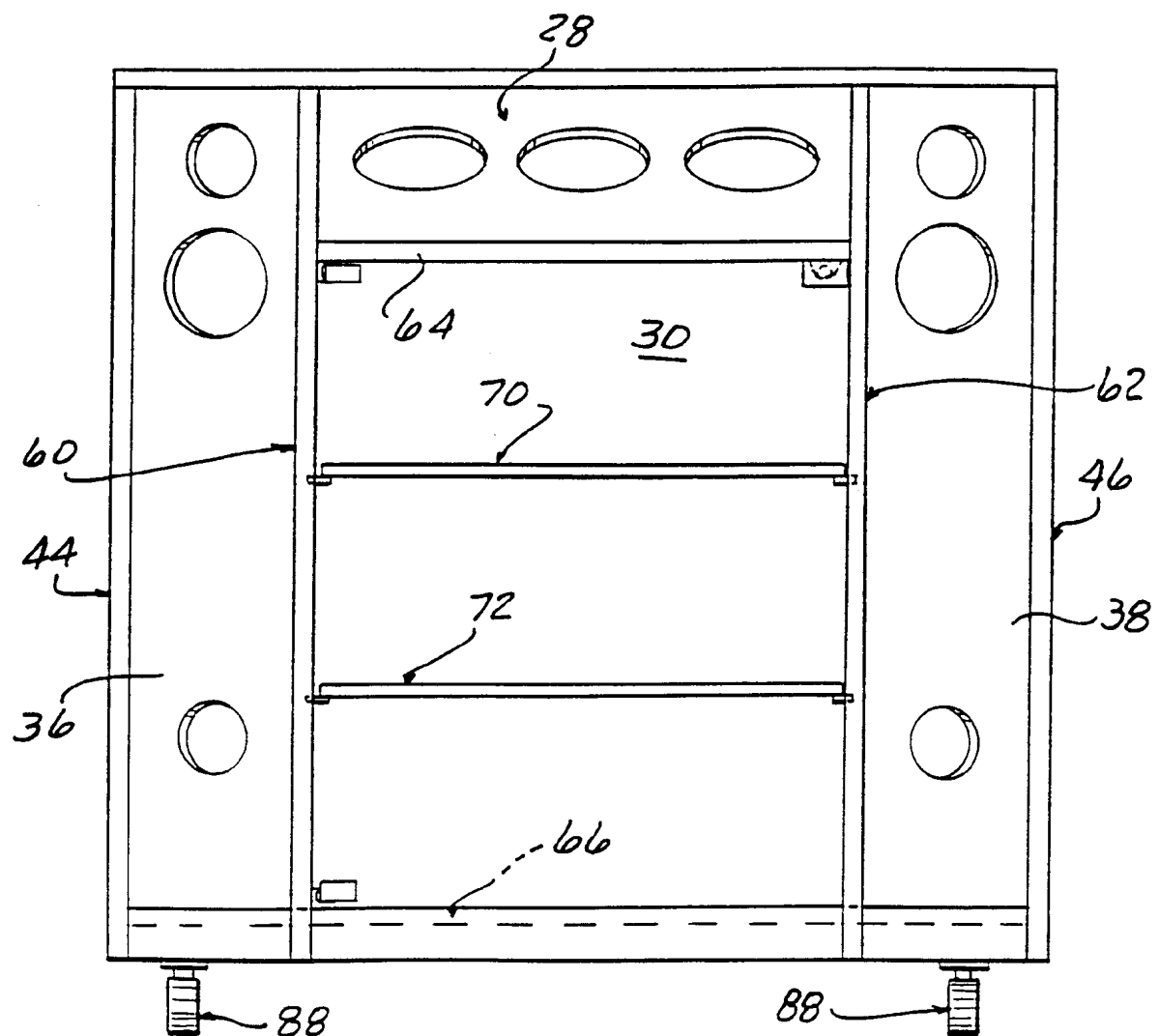
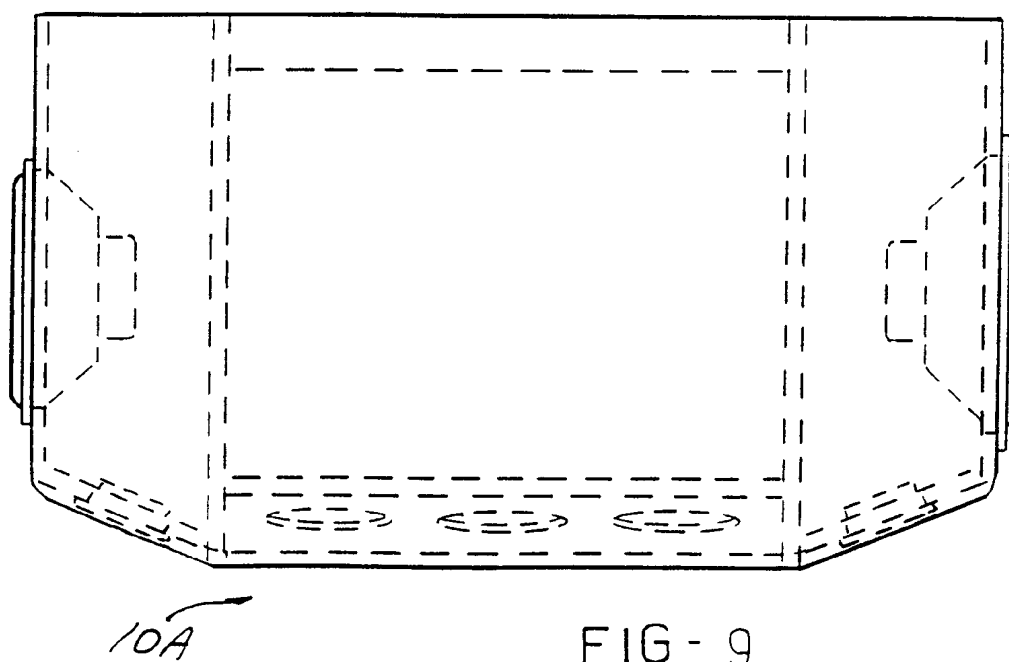
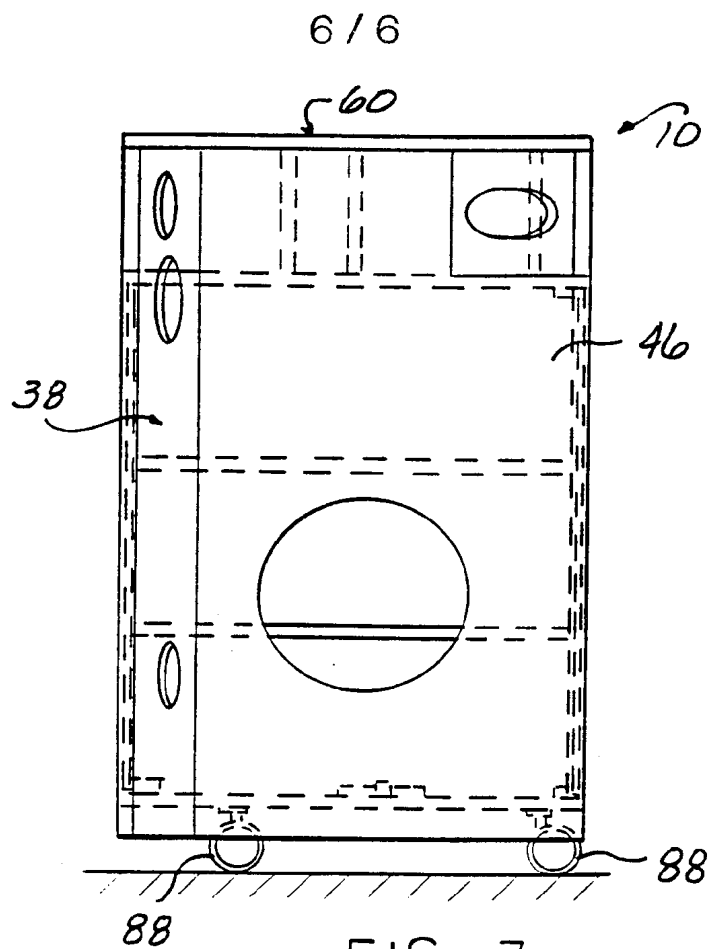


FIG - 6





## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/10412

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04R 25/00

US CL :381/301, 333, 388

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 381/87, 300-307, 332, 333, 345, 182, 388; 181/144, 145, 147, 199; H04N 005/640

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
NONE

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- A	US 3,491,204 A (SHERNO)20 January 1970, figures 1-2	1-3, 5, 8 and 9 ----- 4, 6 and 7
A	US 3,104,729 A (OLSON) 24 September 1963, figures 3, 5-6 and 10.	1-9
A	JA 0,252,280 A (KANAYAMA) 11 November 1991, figure 6	1-9



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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